



PAHSIMEROI FISH HATCHERY

1998 Summer Chinook Brood Year Report

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ABSTRACT

The summer chinook program at Pahsimeroi Fish Hatchery (PFH) is part of an Idaho Power Company (IPC) supplementation/conservation program. The decision to shift from a mitigation program to a supplementation/conservation program was a management decision made by the National Marine Fisheries Service (NMFS) and the Idaho Department of Fish and Game (Department). The decision came about in 1992 when the Pahsimeroi summer chinook salmon became listed as threatened under the Federal Endangered Species Act of 1973.

The Pahsimeroi River weir was installed and trapping of summer chinook salmon began on June 25, 1998. The weir was left in place until trapping ceased on October 5, 1998. The first fish was trapped on June 29 and the last on September 21. A total of 127 chinook salmon *Oncorhynchus tshawytscha* were trapped during the 1998 brood year (18 jacks, 56 adult males, and 53 females). Of the 127 fish trapped, 80 were returned to the Pahsimeroi River to spawn naturally, 43 were retained for hatchery production. There were three trap mortalities and one pond mortality, or 3% pre-spawning mortality.

Fish returned to the Pahsimeroi River for natural spawning consisted of 28 unmarked females, 24 unmarked males, nine right ventral (RV)-clipped males, 8 RV-clipped females, and 11 adipose (AD)-clipped jacks. Fish held for hatchery production consisted of 10 unmarked females, 13 unmarked males, 10 RV-clipped males, seven RV-clipped females, and seven AD-clipped males.

Artificial spawning of summer chinook salmon commenced on August 31, 1998 and concluded on October 9, 1998. A total of 13 females were spawned, yielding 74,105 green eggs, for an average fecundity rate of 5,700 eggs per female. The overall eye-up percentage was 79.6%. All eggs were shipped green to Sawtooth Fish Hatchery (SFH) for incubation and early rearing. This decision was made to compensate for the fact that the PFH has an inadequate backup water supply system for incubation and is unable to isolate juvenile fish from exposure to whirling disease. The SFH raises the fish to a minimum of 3.0 to 3.5 in, which is when the fish are less susceptible to whirling disease. Once the fish have reached this size they are transferred back to PFH. They are held in ponds at the upper facility and raised on river water until they are released in April of the following year.

Starting on April 12, 2000, outlet screens of rearing pond #1 were removed to allow volitional release of chinook smolts into the Pahsimeroi River. All fish had migrated volitionally from the pond by April 17, 2000. There were 53,837 smolts released. At an average of 10.94 fish per lb, the release totaled 4,921 lbs.

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INTRODUCTION

Pahsimeroi Fish Hatchery, located near the town of Ellis, Idaho, is one mile upstream of the confluence of the Pahsimeroi and Salmon rivers. Two rearing ponds are located at a separate location seven miles further upstream on the Pahsimeroi River. The hatchery was constructed in 1967 by Idaho Power Company (IPC) and is owned and funded by IPC. Hatchery operations and management are the responsibility of the Idaho Department of Fish and Game (Department). The summer chinook program is IPC's mitigation obligation for anadromous fish losses caused by the construction and operation of the Hells Canyon Complex on the Snake River. However, due to the 1992 listing of Snake River summer chinook salmon *Oncorhynchus tshawytscha* as threatened under the Federal Endangered Species Act of 1973 (ESA), the Pahsimeroi Fish Hatchery has shifted from a fishery mitigation program to a supplementation–conservation program. The number of adult chinook salmon released into the Pahsimeroi River for natural spawning, as well as the number of those kept at the hatchery for artificial propagation, depends on marked and unmarked fish returns and their listing status. National Marine Fisheries Service (NMFS) permits #922 and #903 authorize the direct and incidental take of listed, naturally produced and artificially propagated summer chinook salmon.

OBJECTIVES

The hatchery's mitigation goals are set for summer chinook salmon and for A-run steelhead.

The following objectives are designed to help accomplish the goals:

1. Rear one million summer chinook smolts for release into the Pahsimeroi River.
2. Trap and spawn sufficient adult summer chinook returning to the Pahsimeroi Hatchery to produce 1.5 million green eggs.
2. Trap adult steelhead and produce 1.5 million steelhead eggs, incubate to the eyed stage, and transport eyed eggs to Niagara Springs Hatchery for rearing to smolt size.
3. Work with Department management, research, and IPC to identify the most effective operating procedures and rearing strategies and develop the facility to enhance survival, fish health, and genetic diversity.

HATCHERY FACILITIES

Pahsimeroi Fish Hatchery is split into two locations. The main site consists of six buildings, two of which are residences for the full-time employees (a 1994 wood-frame home and a 1999 double-wide mobile home). The third building houses a garage, shop, and two-bedroom living quarters for temporary employees. The fourth contains the office, public restrooms, and an incubation room. The storage building has two sections: one for chemical and machinery storage, the other for non-chemical equipment storage. The final building is the spawning building. The upper site consists of a garage/shop, walk-in freezer, and a 7-ft x 10 ft storage shed.

The fish production facilities include the following:

Main Facility

- Removable adult weir across the Pahsimeroi River.
- Fish ladder and 3 ponds (each pond measures 70-ft x 16-ft x 6-ft; two are for holding and the center one is considered the trap).
- Four raceways (100-ft x 4-ft x 3-ft) supplied by river water and limited (200 gallons per minute [gpm]) spring water.
- Incubation room with twenty 16-tray stacks of Heath tray vertical-flow incubators supplied by pumped spring water.

Upper Facility

- Two 300-ft x 40-ft x 5-ft earthen rearing ponds supplied with water from the Pahsimeroi River.
- Two 300-ft x 40-ft x 4-ft earthen settling ponds located directly below the rearing ponds.

Holding capacity for the trap and holding ponds is approximately 2,000 adult summer chinook and 5,000 adult A-run steelhead. With 3 cubic feet per second (cfs) of river water, the raceways can hold up to one million two-inch chinook fry at a .50 density index. At inflows of 20 cfs, holding capacity in the two rearing ponds at the upper facility is one million summer chinook smolts. Incubation capacity is for two million chinook eggs and six million steelhead eggs.

WATER SUPPLY

Incubation water consists of specific pathogen-free (SPF) spring water, which is pumped to a 10,000-gallon holding tank and gravity fed to the incubators. The spring source can produce up to 200 gpm of 52°F to 56°F water.

The adult trap and holding ponds are supplied with water from the Pahsimeroi River through a 0.25-mile earthen intake canal. Water from the canal may also be used to supply the

early rearing raceways. A water right for 40 cfs held by IPC allows hatchery personnel to divert water from the Pahsimeroi River for hatchery operations. Water quality varies throughout the year. Water temperatures also vary from seasonal lows of 33°F in the winter to seasonal highs of 72°F in the summer. Daily fluctuations can be as high as 12 degrees.

Water for the rearing ponds also comes from a diversion in the Pahsimeroi River. A water right for 20 cfs allows a flow of 10 cfs per pond. The water is diverted down a concrete canal, flows through the ponds and into the settling ponds before being discharged back to the Pahsimeroi River.

Both intake canals are equipped with NMFS-approved rotating drum screens designed to prevent entrapment of wild chinook and steelhead from the river into the hatchery facilities.

STAFFING

Permanent and temporary employees staff the hatchery. The permanent staff consists of a Hatchery Manager 1 and an Assistant Hatchery Manager. The temporary employees who assist during the steelhead and summer chinook trapping and spawning seasons, include two bio-aides and one laborer.

At the height of the steelhead and chinook spawning season, Department regional staff, Sawtooth Hatchery staff, and one fishery technician from the Nampa Fisheries Research Office also assist with hatchery operations.

ADULT SUMMER CHINOOK TRAPPING

The trap was operational from June 25 through October 5, 1998. The first adult summer chinook arrived on June 29 while the last arrived on September 21, 1998 (Table 1; Figure 1).

A total of 127 summer chinook were trapped in 1998. The run consisted of 109 adults and 18 jacks, with a sex ratio of 74 males (this includes jacks) to 53 females. Of the 74 males trapped, 37 were of hatchery origin (including 18 jacks) and 37 were of natural origin. Hatchery origin summer chinook were marked with either adipose (AD) or right ventral (RV) fin clips. Summer chinook of natural origin were unmarked. Of the 53 females trapped, 15 were of hatchery origin and 38 were of natural origin (Tables 1–4; Figure 2–4).

ADULT AGE CLASS DETERMINATION

Two sets of criteria were used to determine age class in 1998. The age of hatchery-origin summer chinook was determined by mark type, while the natural-origin summer chinook were aged by fork length.

Table 1. Pahsimeroi Hatchery Brood Year 1998 summer chinook salmon run timing.

Date Trapped	Hatchery Males	Natural Males	Total Males	Hatchery Females	Natural Females	Total Females	Total Trapped
29-Jun	0	1	1	0	2	2	3
30-Jun	0	0	0	0	0	0	0
1-Jul	0	0	0	0	0	0	0
2-Jul	0	0	0	0	1	1	1
3-Jul	0	1	1	0	0	0	1
4-Jul	0	0	0	0	0	0	0
5-Jul	0	0	0	0	0	0	0
6-Jul	0	0	0	0	0	0	0
7-Jul	0	1	1	0	1	1	2
8-Jul	0	0	0	0	0	0	0
9-Jul	0	2	2	0	0	0	2
10-Jul	0	0	0	0	0	0	0
11-Jul	0	1	1	0	1	1	2
12-Jul	0	0	0	0	3	3	3
13-Jul	2	1	3	0	1	1	4
14-Jul	1	0	1	1	3	4	5
15-Jul	1	2	3	1	2	3	6
16-Jul	0	1	1	1	1	2	3
17-Jul	0	2	2	0	3	3	5
18-Jul	1	1	2	1	2	3	5
19-Jul	1	0	1	3	1	4	5
20-Jul	3	1	4	1	1	2	6
21-Jul	1	2	3	0	2	2	5
22-Jul	1	3	4	0	3	3	7
23-Jul	2	0	2	1	1	2	4
24-Jul	1	0	1	0	1	1	2
25-Jul	3	2	5	0	0	0	5
26-Jul	0	2	2	1	0	1	3
27-Jul	1	0	1	0	0	0	1
28-Jul	1	0	1	0	3	3	4
29-Jul	1	1	2	0	1	1	3
30-Jul	1	1	2	0	0	0	2
31-Jul	0	1	1	0	1	1	2
1-Aug	0	0	0	0	0	0	0
2-Aug	2	0	2	0	0	0	2
3-Aug	0	0	0	0	0	0	0
4-Aug	0	0	0	0	0	0	0
5-Aug	2	0	2	1	0	1	3
6-Aug	1	0	1	1	0	1	2
7-Aug	0	0	0	0	0	0	0

Table 1. (continued)

8-Aug	0	0	0	0	0	0	0
9-Aug	0	0	0	0	1	1	1
10-Aug	0	0	0	0	1	1	1
11-Aug	0	0	0	0	0	0	0
12-Aug	0	0	0	0	0	0	0
13-Aug	0	0	0	0	0	0	0
14-Aug	0	0	0	0	0	0	0
15-Aug	0	0	0	0	0	0	0
16-Aug	0	0	0	0	0	0	0
17-Aug	0	0	0	0	0	0	0
18-Aug	0	0	0	0	0	0	0
19-Aug	0	0	0	0	0	0	0
20-Aug	0	0	0	0	0	0	0
21-Aug	0	0	0	0	0	0	0
22-Aug	0	0	0	0	0	0	0
23-Aug	0	0	0	0	1	1	1
24-Aug	0	0	0	0	0	0	0
25-Aug	0	0	0	0	0	0	0
26-Aug	0	0	0	0	0	0	0
27-Aug	0	0	0	0	0	0	0
28-Aug	0	0	0	0	0	0	0
29-Aug	0	0	0	0	0	0	0
30-Aug	0	0	0	0	0	0	0
31-Aug	0	0	0	0	0	0	0
1-Sep	0	0	0	0	0	0	0
2-Sep	0	0	0	0	0	0	0
3-Sep	0	0	0	0	0	0	0
4-Sep	2	0	2	0	0	0	2
5-Sep	0	0	0	0	0	0	0
6-Sep	0	1	1	0	0	0	1
7-Sep	0	0	0	0	0	0	0
8-Sep	0	2	2	0	0	0	2
9-Sep	1	1	2	0	0	0	2
10-Sep	1	1	2	0	0	0	2
11-Sep	4	2	6	0	0	0	6
12-Sep	0	1	1	0	1	1	2
13-Sep	0	2	2	0	0	0	2
14-Sep	1	1	2	2	0	2	4
15-Sep	1	0	1	0	0	0	1
16-Sep	1	0	1	0	0	0	1
17-Sep	0	0	0	0	0	0	0
18-Sep	0	0	0	0	0	0	0

Table 1. (continued)

19-Sep	0	0	0	0	0	0	0
20-Sep	0	0	0	0	0	0	0
21-Sep	0	0	0	1	0	1	1
22-Sep	0	0	0	0	0	0	0
23-Sep	0	0	0	0	0	0	0
24-Sep	0	0	0	0	0	0	0
25-Sep	0	0	0	0	0	0	0
26-Sep	0	0	0	0	0	0	0
27-Sep	0	0	0	0	0	0	0
28-Sep	0	0	0	0	0	0	0
29-Sep	0	0	0	0	0	0	0
30-Sep	0	0	0	0	0	0	0
Oct.1-5	0	0	0	0	0	0	0
Totals	37	37	74	15	38	53	127

Table 2. Length frequency of male summer chinook for Pahsimeroi Fish Hatchery.

MALES

TOTAL TRAPPED		AD-CLIP PONDED		RV-CLIP PONDED		UNMARKED PONDED		RV-CLIP RELEASED		UNMARKED RELEASED		AD-CLIP RELEASED	
FL(CM)	NUMBER	FL(CM)	NUMBER	FL(CM)	NUMBER	FL(CM)	NUMBER	FL(CM)	NUMBER	FL(CM)	NUMBER	FL(CM)	NUMBER
48	1	48	1	48	0	48	0	48	0	48	0	48	0
49	0	49	0	49	0	49	0	49	0	49	0	49	0
50	1	50	0	50	0	50	0	50	0	50	0	50	1
51	0	51	0	51	0	51	0	51	0	51	0	51	0
52	2	52	1	52	0	52	0	52	0	52	0	52	1
53	1	53	1	53	0	53	0	53	0	53	0	53	0
54	1	54	0	54	0	54	0	54	0	54	0	54	1
55	3	55	0	55	0	55	0	55	0	55	0	55	3
56	0	56	0	56	0	56	0	56	0	56	0	56	0
57	1	57	1	57	0	57	0	57	0	57	0	57	0
58	1	58	0	58	0	58	0	58	0	58	0	58	1
59	2	59	0	59	0	59	0	59	0	59	0	59	2
60	1	60	1	60	0	60	0	60	0	60	0	60	0
61	1	61	0	61	0	61	0	61	0	61	0	61	1
62	3	62	2	62	0	62	0	62	0	62	0	62	1
63	0	63	0	63	0	63	0	63	0	63	0	63	0
64	0	64	0	64	0	64	0	64	0	64	0	64	0
65	0	65	0	65	0	65	0	65	0	65	0	65	0
66	1	66	0	66	0	66	0	66	0	66	1	66	0
67	0	67	0	67	0	67	0	67	0	67	0	67	0
68	0	68	0	68	0	68	0	68	0	68	0	68	0
69	0	69	0	69	0	69	0	69	0	69	0	69	0
70	0	70	0	70	0	70	0	70	0	70	0	70	0
71	0	71	0	71	0	71	0	71	0	71	0	71	0
72	0	72	0	72	0	72	0	72	0	72	0	72	0
73	0	73	0	73	0	73	0	73	0	73	0	73	0
74	1	74	0	74	0	74	0	74	0	74	1	74	0
75	1	75	0	75	0	75	1	75	0	75	0	75	0
76	1	76	0	76	0	76	0	76	0	76	1	76	0
77	1	77	0	77	0	77	0	77	0	77	1	77	0
78	0	78	0	78	0	78	0	78	0	78	0	78	0
79	0	79	0	79	0	79	0	79	0	79	0	79	0
80	1	80	0	80	0	80	0	80	0	80	1	80	0
81	1	81	0	81	0	81	0	81	0	81	1	81	0
82	1	82	0	82	0	82	1	82	0	82	0	82	0
83	1	83	0	83	0	83	0	83	0	83	1	83	0
84	1	84	0	84	0	84	0	84	1	84	0	84	0
85	1	85	0	85	0	85	0	85	0	85	1	85	0
86	0	86	0	86	0	86	0	86	0	86	0	86	0
87	0	87	0	87	0	87	0	87	0	87	0	87	0
88	1	88	0	88	0	88	0	88	1	88	0	88	0
89	3	89	0	89	0	89	0	89	2	89	1	89	0
90	1	90	0	90	1	90	0	90	0	90	0	90	0
91	3	91	0	91	0	91	1	91	2	91	0	91	0
92	7	92	0	92	1	92	1	92	1	92	4	92	0
93	3	93	0	93	0	93	0	93	0	93	3	93	0
94	5	94	1	94	1	94	2	94	0	94	1	94	0
95	2	95	0	95	1	95	0	95	0	95	1	95	0
96	2	96	0	96	1	96	1	96	0	96	0	96	0
97	3	97	0	97	1	97	0	97	0	97	2	97	0
98	2	98	0	98	1	98	0	98	1	98	0	98	0
99	3	99	0	99	0	99	2	99	0	99	1	99	0
100	3	100	0	100	0	100	1	100	1	100	1	100	0
101	2	101	0	101	0	101	2	101	0	101	0	101	0
102	0	102	0	102	0	102	0	102	0	102	0	102	0
103	3	103	0	103	1	103	1	103	0	103	1	103	0

Table 2. continued.

104	0	104	0	104	0	104	0	104	0	104	0	104	0
105	0	105	0	105	0	105	0	105	0	105	0	105	0
106	0	106	0	106	0	106	0	106	0	106	0	106	0
107	0	107	0	107	0	107	0	107	0	107	0	107	0
108	2	108	0	108	1	108	0	108	0	108	1	108	0
TOTALS	74		8		9		13		9		24		11

Table 3. Length frequency of female summer Chinook for Pahsimeroi Fish Hatchery

FEMALES											
TOTAL TRAPPED		AD-CLIP PONDED		RV-CLIP PONDED		UNMARKED PONDED		RV-CLIP RELEASED		UNMARKED RELEASED	
FL(CM)	NUMBER	FL(CM)	NUMBER	FL(CM)	NUMBER	FL(CM)	NUMBER	FL(CM)	NUMBER	FL(CM)	NUMBER
55	0	55	0	55	0	55	0	55	0	55	0
56	0	56	0	56	0	56	0	56	0	56	0
57	0	57	0	57	0	57	0	57	0	57	0
58	0	58	0	58	0	58	0	58	0	58	0
59	0	59	0	59	0	59	0	59	0	59	0
60	0	60	0	60	0	60	0	60	0	60	0
61	0	61	0	61	0	61	0	61	0	61	0
62	0	62	0	62	0	62	0	62	0	62	0
63	0	63	0	63	0	63	0	63	0	63	0
64	0	64	0	64	0	64	0	64	0	64	0
65	0	65	0	65	0	65	0	65	0	65	0
66	0	66	0	66	0	66	0	66	0	66	0
67	0	67	0	67	0	67	0	67	0	67	0
68	0	68	0	68	0	68	0	68	0	68	0
69	0	69	0	69	0	69	0	69	0	69	0
70	0	70	0	70	0	70	0	70	0	70	0
71	0	71	0	71	0	71	0	71	0	71	0
72	2	72	0	72	0	72	1	72	0	72	1
73	0	73	0	73	0	73	0	73	0	73	0
74	0	74	0	74	0	74	0	74	0	74	0
75	1	75	0	75	0	75	0	75	0	75	1
76	1	76	0	76	0	76	1	76	0	76	0
77	4	77	0	77	0	77	1	77	0	77	3
78	0	78	0	78	0	78	0	78	0	78	0
79	2	79	0	79	0	79	0	79	0	79	2
80	0	80	0	80	0	80	0	80	0	80	0
81	1	81	0	81	0	81	0	81	0	81	1
82	1	82	0	82	0	82	0	82	0	82	1
83	1	83	0	83	0	83	0	83	1	83	0
84	2	84	0	84	0	84	0	84	0	84	2
85	1	85	0	85	0	85	0	85	1	85	0
86	0	86	0	86	0	86	0	86	0	86	0
87	3	87	0	87	1	87	0	87	1	87	1
88	4	88	0	88	1	88	1	88	1	88	1
89	11	89	0	89	1	89	3	89	2	89	5
90	4	90	0	90	1	90	0	90	1	90	2
91	6	91	0	91	1	91	0	91	1	91	4
92	1	92	0	92	0	92	0	92	0	92	1
93	5	93	0	93	2	93	2	93	0	93	1
94	1	94	0	94	0	94	0	94	0	94	1
95	1	95	0	95	0	95	1	95	0	95	0
96	0	96	0	96	0	96	0	96	0	96	0
97	1	97	0	97	0	97	0	97	0	97	1
98	0	98	0	98	0	98	0	98	0	98	0
99	0	99	0	99	0	99	0	99	0	99	0
100	0	100	0	100	0	100	0	100	0	100	0
101	0	101	0	101	0	101	0	101	0	101	0
102	0	102	0	102	0	102	0	102	0	102	0
103	0	103	0	103	0	103	0	103	0	103	0
104	0	104	0	104	0	104	0	104	0	104	0

Table 3. continued.

105	0	105	0	105	0	105	0	105	0	105	0
106	0	106	0	106	0	106	0	106	0	106	0
107	0	107	0	107	0	107	0	107	0	107	0
108	0	108	0	108	0	108	0	108	0	108	0
TOTALS	53		0		7		10		8		28

Table 4. Pahsimeroi Fish Hatchery summer Chinook disposition summary, Brood Year 1998.

Released For Natural Spawning

	4 year old Hatchery Males	5 year old Hatchery Males	4 year old Hatchery Females	5 year old Hatchery Females	4 year old Natural Males	5 year old Natural Males	4 year old Natural Females	5 year old Natural Females	Natural Jacks	Hatchery Jacks
Total	0	9	0	8	6	18	9	19	0	11
% of Total Released	0.0%	11.3%	0.0%	10.0%	7.5%	22.5%	11.3%	23.8%	0.0%	13.8%

Ponded for Hatchery Production

	4 year old Hatchery Males	5 year old Hatchery Males	4 year old Hatchery Females	5 year old Hatchery Females	4 year old Natural Males	5 year old Natural Males	4 year old Natural Females	5 year old Natural Females	Natural Jacks	Hatchery Jacks
Total	0	10	0	7	2	11	3	7	0	7
% of Total Ponded	0.0%	21.3%	0.0%	14.9%	4.3%	23.4%	6.4%	14.9%	0.0%	14.9%

Trap Totals for Brood Year 1998

	4 year old Hatchery Males	5 year old Hatchery Males	4 year old Hatchery Females	5 year old Hatchery Females	4 year old Natural Males	5 year old Natural Males	4 year old Natural Females	5 year old Natural Females	Natural Jacks	Hatchery Jacks
Total	0	19	0	15	8	29	12	26	0	18
% of Total Trapped	0.0%	15.0%	0.0%	11.8%	6.3%	22.8%	9.4%	20.5%	0.0%	14.2%

Table 5. Brood year 1998 summer Chinook egg incubation record for Pahsimeroi Fish Hatchery.

FORK LN. (CM)	SPAWN DATE	EYED	PICKOFF	GREEN	BKD	VIRO	DESTINATION	PERCENT EYE-UP	COMMENTS
86	8/31/98	3,471	919	4,390	NEG	NEG	shipped SFH	79.1%	poor eggs
77	8/31/98	3,570	480	4,050	LOW +	NEG	shipped SFH	88.1%	
71	8/31/98	2,340	375	2,715	LOW +	NEG	shipped SFH	86.2%	
96	9/7/98	6,507	537	7,044	LOW +	NEG	shipped SFH	92.4%	
78	9/7/98	3,960	782	4,742	LOW +	NEG	shipped SFH	83.5%	
94	9/14/98	3,780	2,430	6,210	LOW +	NEG	shipped SFH	60.9%	
91	9/14/98	2,570	2,843	5,413	LOW +	NEG	shipped SFH	47.5%	
91	9/17/98	5,486	370	5,856	LOW +	NEG	shipped SFH	93.7%	
93	9/21/98	4,355	2,379	6,734	LOW +	NEG	shipped SFH	64.7%	
91	9/24/98	5,772	1,250	7,022	LOW +	NEG	shipped SFH	82.2%	
87	9/28/98	7,176	335	7,511	LOW +	NEG	shipped SFH	95.5%	
90	10/6/98	6,660	351	7,011	NEG	NEG	shipped SFH	95.0%	
93	10/9/98	3,367	2,040	5,407	LOW +	NEG	shipped SFH	62.3%	growth hormone
TOTALS:		59,014	15,091	74,105				79.6%	

Table 6. Brood Year 1998 feed summary for Pahsimeroi Fish Hatchery.

FEED SIZE	LBS. FED TO DATE	COST PER POUND	TOTAL COST TO DATE
Rangen Soft-Moist STR	44	\$1.15	\$50.60
Rangen Soft-Moist 1/32 1/32	132	\$0.80	\$105.20
Rangen Soft-Moist 3/64	308	\$0.77	\$237.16
Rangen Soft-Moist 1/16	220	\$0.75	\$165.22
Rangen Soft-Moist 3/32	1,496	\$0.72	\$1,071.14
Bio-Diet Grower 1.3 mm	44	\$0.78	\$34.23
Bio-Diet Grower 1.5 mm	132	\$0.72	\$95.44
Bio-Diet Grower 2.0 mm AQM-100	353	\$1.61	\$568.33
Bio-Diet Grower 2.5 mm AQM-100	1,232	\$1.78	\$2,192.66
Bio-Diet Grower 3.0 mm	2,847	\$0.80	\$2,277.60
Totals:	6,808		\$6,797.88

Table 7. Pathology fish health report

SUMMARY OF FISH AUTOPSY

ACCESSION NO:	00-15	LOCATION:	Pahsimeroi Hatchery
SPECIES:	Chinook Summer	AUTOPSY DA	2/10/00
STRAIN:	Pahsimeroi	AGE:	Juv
UNIT:	pond 2	SAMPLE SIZE:	20
REASON FOR AUTOPSY:	prelib.		
INVESTIGATOR(S);	Munson		

	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
LENGTH	0.00	0.00	0.00
WEIGHT	0.00	0.00	0.00
KTL*:	0.00	0.00	0.00
CTL:**	0.00	0.00	0.00
HEMATOCRIT:	47.4	5.01	0.11
LEUCOCRIT:	0.00	0.00	0.00
SERUM PROTEIN:	5.1	0.48	0.01

*EXPRESSED AT KTL TIMES 10 TO THE FIFTH POWER

**CONVERTED FROM KTL;EXPRESSED AS CTL TIMES 10 TO THE FOURTH POWER

EYES		GILLS		PSEUDO BRANCHES		THYMUS		MESEN. FAT		SPLEEN		HIND GUT		KIDNEY		LIVER		BILE	
N	20	N	20	N	20	0	20	0	0	B	20	0	20	N	20	A	0	0	0
B1	0	F	0	S	0	1	0	1	2	R	0	1	0	S	0	B	17	1	0
B2	0	C	0	L	0	2	0	2	5	G	0	2	0	M	0	C	3	2	0
E1	0	M	0	S&L	0			3	7	NO	0			G	0	D	0	3	0
E2	0	P	0	I	0			4	6	E	0			U	0	E	0		
H1	0	OT	0	OT	0	Mean=0.00				OT	0	Mean=0.00		T	0	F	0		
H2	0			O	0			Mean=2.85								OT	0	Mean=0.00	
M1	0																		
OT	0																		

SUMMARY OF NORMALS

20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
SEX		M:0		F:0		U:0													

GENERAL REMARKS

FINS: GOOD

GONADS:

SKIN: LOSING
SCALES

OTHER:

Table 8. Brood Year 1998 production costs for Pahsimeroi Fish Hatchery.

Number of fish	Pounds of feed	Cost of Feed	Pounds of Fish	Conversion	Total Budget	Cost per 1,000 fish	Cost per lb of fish
53,837	6,808	\$6,797.88	4,921	1.4	\$588,807	\$10,936.85	\$119.65

*Does not include capital outlay

Table 9. Brood Year 1998 smolt survival by life stage, Pahsimeroi Fish Hatchery

Life Stages	Numbers	Survival Percentages
Green Eggs	74,105	
Egg Pickoff	15,091	
Eyed Eggs	59,014	79.6%
Alevin Pickoff	2,971	
Fry Poned	56,043	75.6%
Fry Mortality	2,123	
Fingerling Poned	53,920	72.8%
Fingerling Mortality	83	
Smolts Released	53,837	72.6%

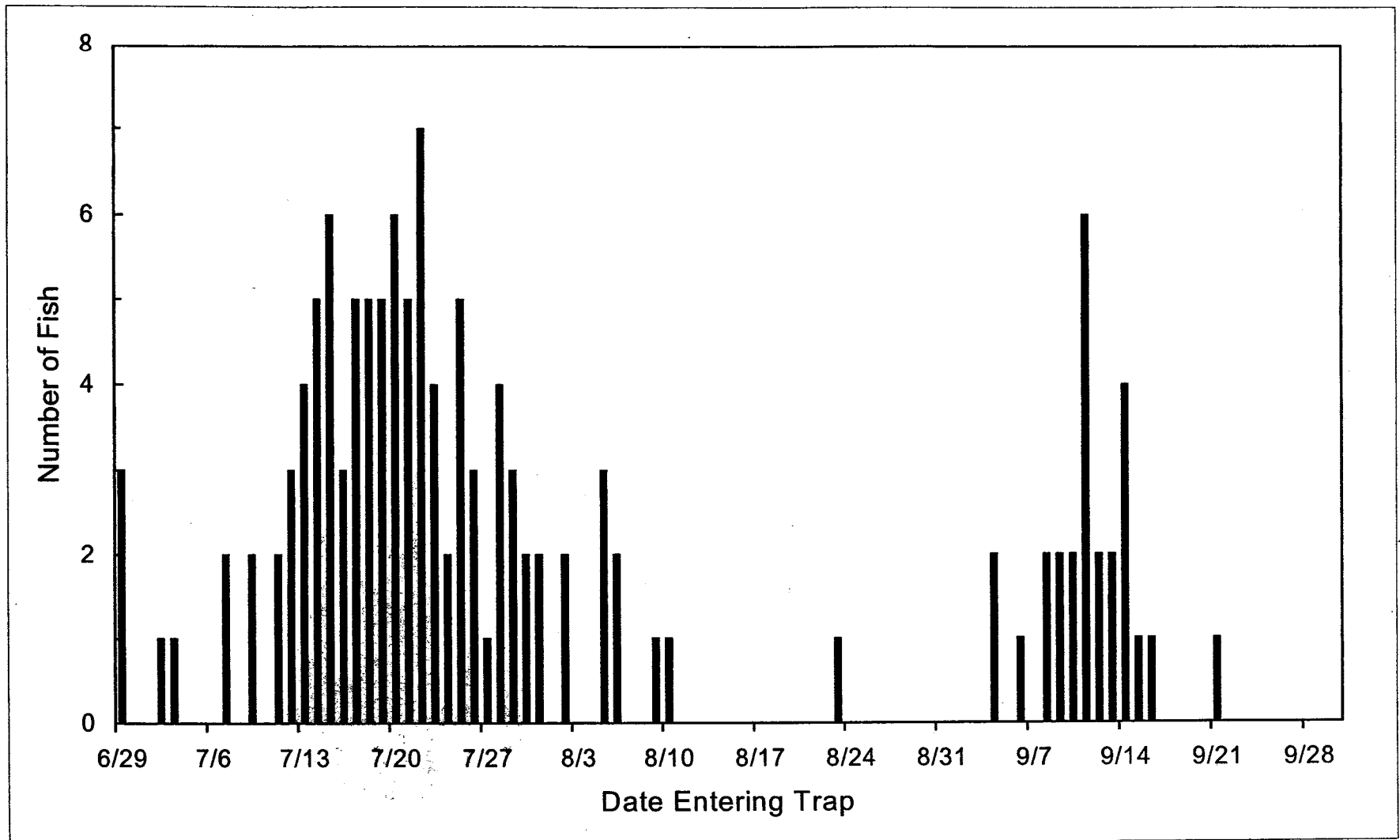


Figure 1. Brood Year 1998 summer chinook salmon run timing for Pahsimeroi Fish Hatchery.

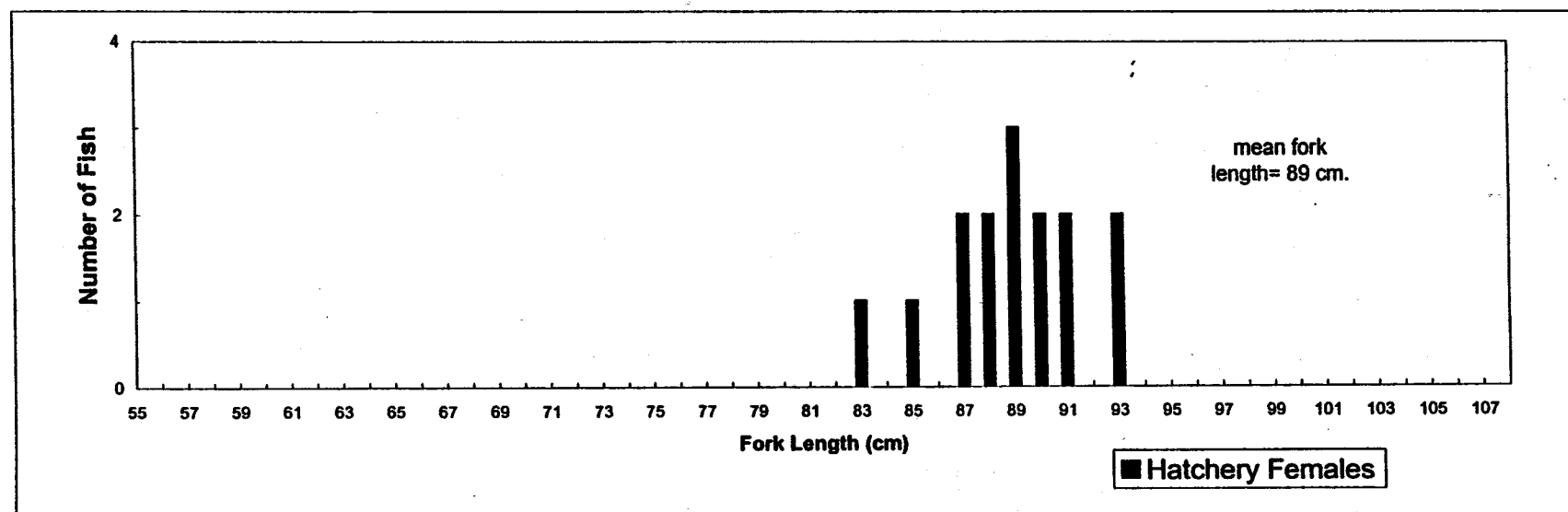
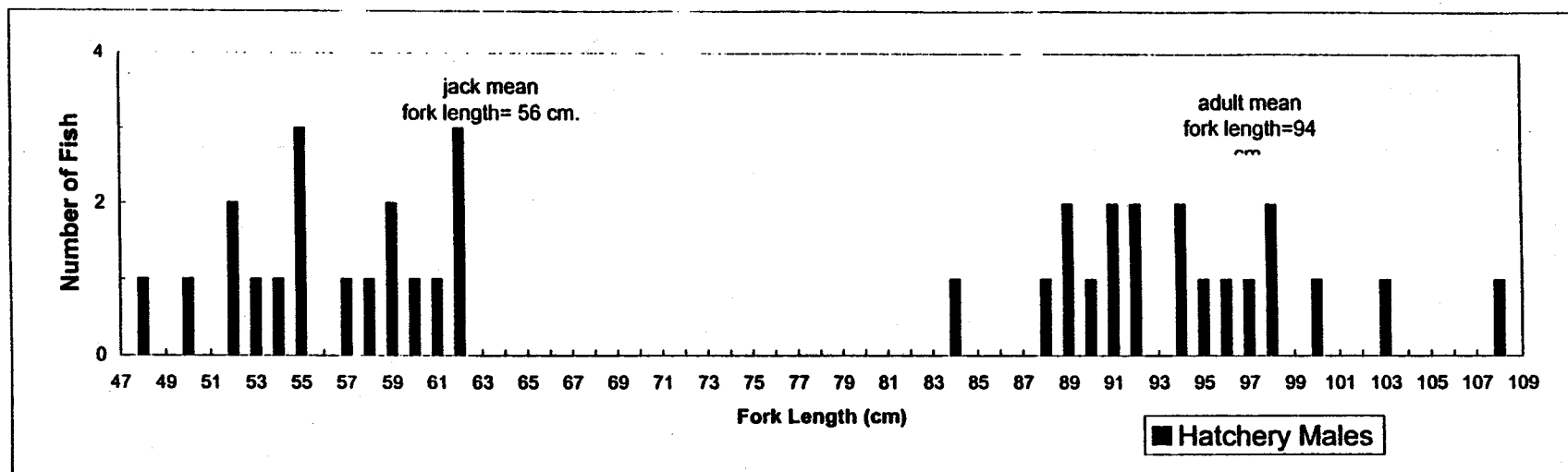


Figure 2. Length frequency of hatchery-origin summer chinook salmon, Brood Year 1998.

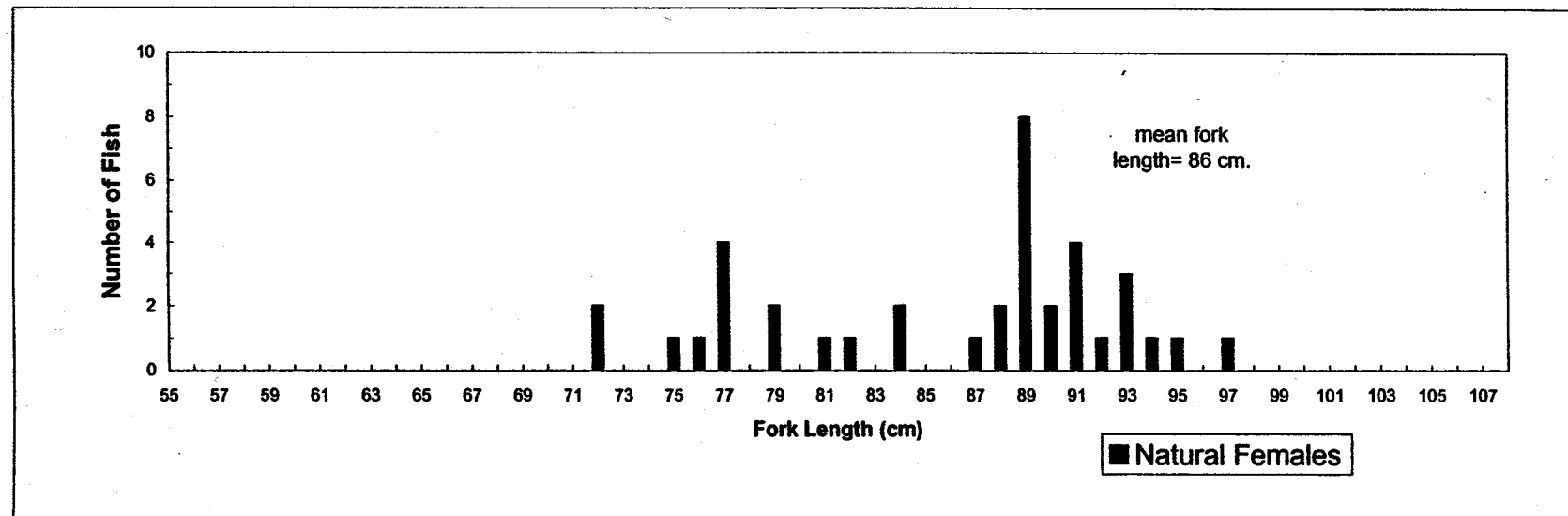
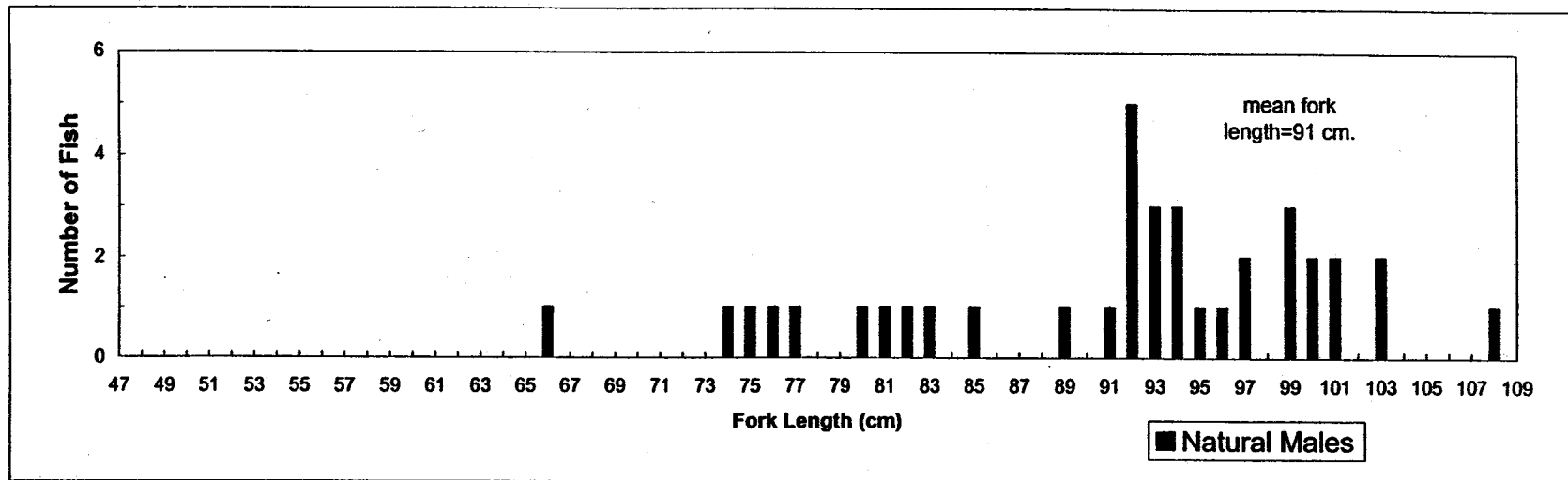


Figure 3. Length frequency of natural-origin summer chinook salmon, Brood Year 1998.

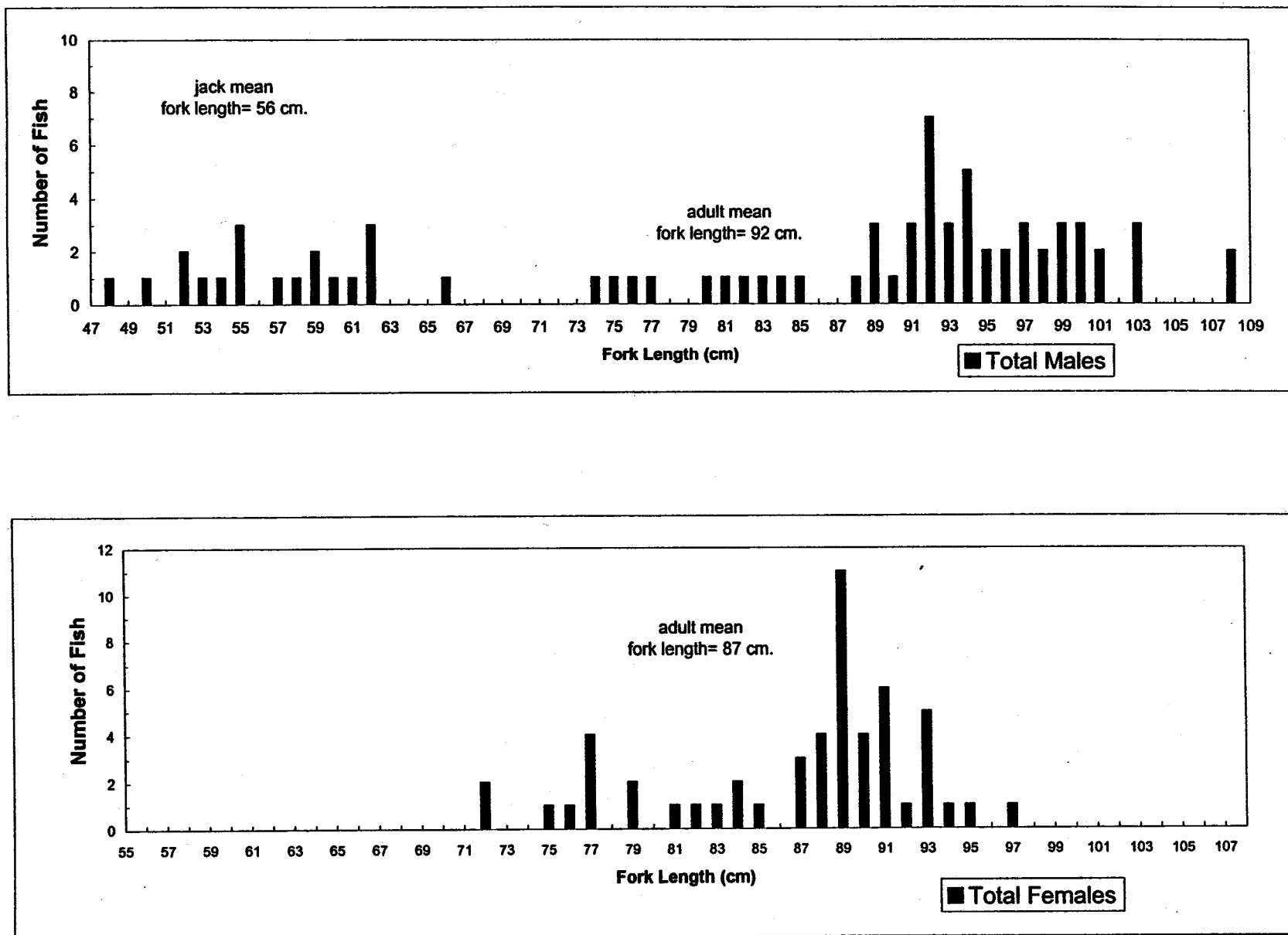


Figure 4. Length Frequency of all summer chinook trapped, Brood Year 1998.

Hatchery-origin summer chinook with a RV fin clip were classified as five-year-olds. These fish, from Brood Year 1993, were released as smolts in 1995. All hatchery-origin summer chinook with AD fin clips were classified as three-year-olds. These fish, from Brood Year 1995, were released as smolts in 1997. All adult summer chinook trapped at the Pahsimeroi Hatchery in 1994 were released to spawn naturally above the weir. Therefore, no fish of hatchery-origin from BY94 were trapped this season.

The age class criteria for natural-origin (unmarked) fish follows:

- Chinook with fork lengths greater than 82 cm were classified as five years old.
- Chinook with fork lengths between 62 cm and 82 cm inclusive were classified as four years old.
- Chinook with fork lengths less than 62 cm were classified as jacks.

Table 4 includes a breakdown of age class results.

SPECIAL MARKS/TAGS

Three summer chinook were found to have special tags: a 4-year-old natural origin male, a 5-year old natural-origin male and a 5-year-old natural-origin female. The natural-origin 4-year-old male had a radio tag as well as a Passive Integrated Transponder (PIT) tag. The two 5-year-old fish both were jaw tagged.

Upon their arrival in the trap all fish were checked for special marks or tags. The jaw-tagged fish were marked by NMFS personnel at Lower Granite as part of a run timing, migration study. The jaw tagged fish with the number C3293 was tagged as an adult on June 18, 1998 and the other jaw tagged fish with the tag number of C5042 was tagged as an adult on June 24, 1998. The radio transmitter belonged to researchers from the University Of Idaho who are investigating what flow patterns the adults use as they approach the dams and also what orifice they go through. A query of the Ptagis data base indicates that the PIT-tagged fish was tagged by Idaho Fish and Game Nampa Research personnel at the Pahsimeroi Hatchery on October 29, 1995. The length of the fish at tagging was 120 mm and the weight was 18.2 g. The fish originated from brood year 1994 and migrated during the fall of 1995. It was detected as an adult during its upstream migration at Lower Granite Dam on June 28, 1998 at 5:28 am.

A summary of the information on these tagged fish is as follows:

Trap Date	Sex	Fork Length	Marks	Jaw Tag #	Radio Channel/Frequency	Pit #
7/14/98	F	88cm	None	NMFS C3293		
7/22/98	M	75cm	None		Channel 10, Code 11	1f7f404959
9/13/98	M	99cm	None	NMFS C5042		

ADULT HANDLING PROCEDURES

The trap was checked daily. All salmon were anesthetized in a solution of MS-222 buffered with sodium bicarbonate. While anesthetized, fish were examined for fin clips, scanned for coded wire and PIT tags, measured to the nearest centimeter for fork length, and identified by sex. Only one PIT tag was found this season. Scale samples were collected from all fish trapped, and every fish was injected (intraperitoneal) with erythromycin at a double dosage rate of 20 mg/kg body weight. All fish were measured for standard hypural length in addition to fork length. All fish were allowed to recover in a freshwater recovery tank before being ponded or released.

ADULT HOLDING POND RECORD

Since the listing of the Pahsimeroi summer chinook in 1992, NMFS has sub-divided the population into three groups. Naturally produced unmarked listed, hatchery supplementation marked listed, and hatchery reserve group marked unlisted fish. Fish that are held for hatchery broodstock are determined yearly by Department Fisheries Biologist Pete Hassemer. The proposed broodstock strategy, which is driven by the number and lineage of returning females, is designed to balance the risks and benefits of hatchery and natural production. In general, the majority (about 67%) of the unmarked, listed adults will be released to spawn naturally as specified in the current permits. Supplementation broodstocks will be maintained using unmarked, listed fish and either marked listed or marked non-listed adults, according to the Department's supplementation study designs and depending on fish availability. The Department may also elect to maintain a "reserve" group derived from known hatchery x hatchery crosses of returning adults if fish availability allows (Virgil Moore Fisheries Bureau Chief).

Thirty males and 17 females were held for hatchery broodstock. For a breakdown of origin and age class refer to Table 4.

The holding pens were sorted for the first time on August 10. They were then sorted twice a week. In 1998, the female pen was treated three times weekly with a 1-hour, 167 ppm formalin treatment to prevent mortality caused by secondary mycotic infections.

This year, adult mortality was limited to four natural origin fish or 3.1% of the total run. Trap mortalities consisted of two females that stranded themselves on the shade cover, and one that was wedged between the crowd rack and the fence in the trap. The last female died in the holding pond prior to spawning. The cause of death for this fish is unknown.

ADULT RELEASES

Eight hatchery-origin and 28 natural-origin female summer chinook were released to spawn naturally in the Pahsimeroi River. Twenty hatchery-origin (11 jacks) and 24 natural-origin male summer chinook were released to the same location (Table 4). All summer chinook that were released into the Pahsimeroi River for natural reproduction were released the same day they were trapped.

SUMMER CHINOOK SPAWNING AND INCUBATION

Spawning began on August 31 and concluded on October 9, 1998. A total of 13 females were spawned, yielding 74,105 green eggs (Table 5). This resulted in an average fecundity rate of 5,700 eggs/female.

Each ripe female was killed, then spawned by the incision method. Prior to incision, a 1-cc sample of ovarian fluid was collected to test for the viral pathogens Infectious Hematopoietic Necrosis Virus (IHNV) and Infectious Pancreatic Necrosis Virus (IPNV). After egg collection and fertilization, kidney samples were collected to test for bacterial kidney disease (BKD) and head wedges were collected to test for whirling disease. All samples were sent to the Eagle Fish Health Laboratory for analysis. Viral samples tested negative and all kidney samples tested low positive or negative. No eggs were culled.

During the first three spawning sessions a one-to-one spawning ratio of males to females was used. After that, a matrix-spawning schedule was implemented. Each female's eggs were split in half and each half placed into a separate bucket. Males were selected at random and a different male was used to fertilize each half. This method is known as a split random cross. Each male was spawned directly into the bucket. Spring water was then added to the gametes. Due to the difference in temperature between the eggs and spring water, the spring water was tempered to match the temperature of the eggs to prevent temperature shock. The gametes were gently hand-stirred for five to ten seconds to ensure fertilization. Egg buckets were covered and set aside for five minutes. Tempered water was then used to rinse the eggs. The eggs were water-hardened in a 100 ppm solution of argentyne and allowed to sit

for 30 minutes. The argentyne was then poured off and replaced with tempered water and the eggs allowed to sit for another 30 minutes. Finally, eggs were poured into aqua-seed tubes, placed in coolers of water chilled with ice and transported to Sawtooth Fish Hatchery (SFH) for incubation. Under the direction of a new Hatchery Manager, all eggs were shipped green to the SFH for incubation and early rearing. This decision was made to compensate for the fact that the Pahsimeroi Hatchery has an inadequate back-up water supply system for incubation and is unable to isolate juvenile fish from exposure to whirling disease.

Upon arrival at the SFH, all eggs were tempered before being placed in standard vertical stack incubators. The incubator trays were loaded at the rate of one female's eggs per tray. From 72 hours after arrival until eye-up, eggs were treated every weekday with a 1,667 ppm formalin treatment. At eye-up, the eggs were shocked by dropping them into a bucket of water from a height of approximately 2 feet. The dead eggs were picked by hand and counted, and the live eggs were then enumerated by the Von Bayer method. The number of dead eggs was added to the live egg number to obtain the total number of green eggs per female. The eyed-egg number was divided by the green egg number to determine eye-up survival rates. The overall eye-up percentage was 79.6 compared to other years when the eye-up percentages ranged in the 90s. Shipping the eggs green may partially explain this lower than normal eye-up percentage. A summary of eye-up rates and health status by egg lot is presented in table 5.

ADULT CARCASS DISPOSITION

During the spawning season, all carcasses were placed directly into the Pahsimeroi River below the weir to provide a nutrient base for naturally-produced chinook fry which is allowed under our current permit with NMFS.

FISH PRODUCTION

A total of 56,558 swim-up fry were ponded in the early rearing vats at SFH from December 1998 through March 1999. Wellwater with a temperature of 40°F was used for early rearing. Summer chinook salmon are more susceptible to whirling disease when they are less than 3.5 inches in length. To minimize the impact of whirling disease, fish are reared on SPF water until they reach a size of approximately 3.5 inches in length. Once the summer chinook reach this size, they are transferred to outside raceways supplied with river water. The SFH reared the summer chinook according to Integrated Hatcheries Operation Team (IHOT) guidelines. All fish were fed Bio-Oregon and Rangen feed.

During July 1999, an increased mortality was observed in the raceways. Approximately 2,478 fish died for unknown reasons. Pathologists from Eagle Fish Health Lab performed

necropsies but the source of the mortality was never determined. Fish pathologists speculated that the cause might have been genetic. By the end of July the mortality rate leveled off to normal.

To prevent BKD, the fish received two prophylactic-medicated feed treatments, the first of which was administered during June and the second in late September 1999. Both treatments lasted for 28 days. A total of 353 lbs of Aquamycin 2.0 mm feed was administered during the June treatment (Table 6). The second treatment consisted of 1,232 lbs of Aquamycin 2.5 mm feed (Table 6).

On September 13, 1999, 53,920 summer chinook pre-smolts were transferred by truck to PFH from SFH and ponded in rearing pond #2. They averaged 40 fish per lb (4.0 inches), for a total biomass of 1,350 lbs. All fish received the necessary fin clips and/or tags prior to their return to PFH.

Brood Year 1998 smolts were fed 6,808 lbs of feed during their rearing cycle, resulting in a feed conversion of 1.40 (Table 6). The original number of summer chinook, less observable mortalities, was used to calculate the conversion rate. It should be noted however, that predation by river otters and various bird species was observed but cannot be quantified. Attempts to live-trap the otters were unsuccessful. This otter problem is becoming a yearly occurrence. Efforts are being made to install a small fence around the ponds to keep otters and other predators out.

Prerelease organosomatic indices can be found in Table 7. Production costs are summarized in Table 8, and losses and survival percentages by life-stage are summarized in Table 9.

SMOLT RELEASES

A total of 53,837 smolts were released volitionally from April 12 to April 17, 2000. The outlet screens were pulled on April 12, and a set of dam boards was pulled each day thereafter until all fish migrated from the pond. Pulling dam boards increases the turnover rate through the pond and speeds outmigration. The smolts averaged 10.94 fish per lb (6.06 in) at the time of release for a total weight of 4,921 lbs.

FISH HEALTH

Diseases Encountered and Treatment

The Pahsimeroi summer chinook produced at Pahsimeroi and Sawtooth hatcheries did not experience acute or chronic mortalities due to etiologic agents. These fish were treated prophylactically with erythromycin medicated feed for *Renibacterium salmoniarum* under the

6013/4333 INAD. Once the fish were introduced to surface water at Sawtooth they became infected with *Myxobolus cerebralis* (Doug Munson Fisheries Pathologist).

Organosomatic Indices

See Table 7.

Other Assessments.

The demand for SPF water at Sawtooth continually increases, which forces Pahsimeroi chinook to be exposed to *Myxobolus Cerebralis* sooner than the 3.5-in length goal. It is strongly recommended that a SPF water source of sufficient quantity be developed at Pahsimeroi Hatchery to rear chinook to a minimum of 3.5-in prior to exposure to whirling disease.

FISH MARKING

All Brood Year 1998 fish received an adipose clip during May 1998 at Sawtooth Fish Hatchery. All BY98 summer chinook are listed and 500 presmolts were injected with PIT-tags in March. The purpose for the PIT-tags is to determine survivability of the chinook smolts on their downstream migration to the ocean.

HATCHERY IMPROVEMENTS

- Idaho Power Company completed several hatchery electrical upgrades. All incoming electrical power is now routed into a load center adjacent to the spring water pump house.
- A new chemical pump was purchased for treating salmon with formaldehyde solution.
- A Craftsman toolbox and 241-piece tool set, a Skilsaw, Porter Cable random orbit sander, and a Makita miter saw were purchased.
- Two-way radios were installed in both the GMC ½-ton and GMC 2-ton trucks. Also, a hand-held radio was purchased for the Dodge ¾-ton truck.
- Idaho Power Company replaced the existing mobile home with a new 1,778 sq ft Marlette manufactured home.
- MacKenzie construction replaced two office doors and the screen door on residence # 2.

- Hatchery personnel installed a new barbed wire fence around the upper facility to keep cows off the premises.
- The House of Bargains installed a new ceramic tile floor in the office.
- Hatchery personnel replaced the fluorescent lights in the office.
- Stoddard Construction replaced the septic tank next to the dorm and also replaced the float valve in the dosing tank. Also, they installed two new 1-in water lines for the new manufactured home. One line is designated for the heat pump and the other line provides water for the rest of the home.
- Challis Septic pumped out all three existing septic tanks.
- A-1 Heating from Boise installed new propane stoves in both residences.
- Glen Robinson Electric installed fluorescent lights, electrical outlets and a heater in the garage of residence #1.
- Gene Westergard Construction graded the roadway into the hatchery.
- A new Jet drill press was purchased from Western Tool Supply in Boise.

RECOMMENDATIONS

Recommendations for PFH include developing a SPF water source to provide rearing conditions free of disease. Due to the presence of whirling disease at Pahsimeroi all chinook eggs are currently sent green to Sawtooth for incubation and early rearing. Pahsimeroi needs a minimum of seven cfs of 45°F-50°F SPF water, four additional raceways (100-ft x4-ft x3-ft), an alarm system and new vertical flow through incubators.

ACKNOWLEDGMENTS

We would like to thank Paul Abbott and the staff of IPC for their continued help and support. Also, we would like to thank the crew at Sawtooth Fish Hatchery for all their help with incubation and early rearing.

Appendix A. Pahsimeroi Fish Hatchery summer chinook smolt release and adult return information.

RELEASE DATE	NUMBER	3-YRS	4-YRS	5-YRS	TOTAL	RETURN YEARS	% RETURN	Return Year	Returning Adults*
May-70	300,000	89	N/A	101	N/A	71,72,73	N/A	73	526
May-71	250,000	40	425	14	479	72,73,74	0.192%	74	152
May-72	250,000	20	138	76	234	73,74,75	0.094%	75	81
May-73	347,000	1	5	32	38	74,75,76	0.011%	76	221
May-74	330,000	8	189	436	633	75,76,77	0.192%	77	551
May-75	114,000	53	115	X	X	76,77,78	N/A	78	n/a
May-76	121,000	7	X	32	X	77,78,79	N/A	79	32
May-77	235,000	X	O	4	X	78,79,80	N/A	80	33
May-78	218,000	1	29	13	43	79,80,81	0.020%	81	29
Mar-83	13,690	11	72	30	113	84,85,86	0.825%	82	35
Apr-84	55,800	27	278	52	357	85,86,87	0.640%	83	101
Apr-85	209,155	37	408	716	1,161	86,87,88	0.555%	84	26
Mar-86	12,095	13	47	31	91	87,88,89	0.752%	85	83
Mar-87	258,600	75	180	42	297	88,89,90	0.115%	86	308
Mar-88	598,500	135	389	79	603	89,90,91	0.101%	87	460
Mar-89	1,016,300	39	139	27	205	90,91,92	0.020%	88	763
Mar-90	1,058,000	20	98	119	237	91,92,93	0.022%	89	211
Mar-91	227,500	6	37	1	44	92,93,94	0.019%	90	431
Mar-92	605,900	13	26	0	39	93,94,95	0.006%	91	218
Apr-93	375,000	7	73	8	88	94,95,96	0.023%	92	125
Apr-94	130,510	7	27	9	43	95,96,97	0.033%	93	156
Apr-95	147,429	5	60	34	99	96,97,98	0.067%	94	27
Apr-96	0	n/a	n/a	n/a	n/a	97,98,99	n/a	95	73
Apr-97	122,017	18	207			98,99,00		96	35
Apr-98	65,648	78				99,00,01		97	69
Apr-99	135,669					00,01,02		98	34
Apr-00	53,837					01,02,03		99	285

Appendix B. Pahsimeroi Fish Hatchery chinook salmon stock hatchery.

Brood Year	Egg Source	No. Eggs	Genetic Stock	Release Year	Smolts Released	Release Site
1981	Hayden Creek	<500,000	Spring Chinook	1983	437,332	Pahsimeroi River
1981	Pahsimeroi	<25,000	Summer Chinook	1983	13,700	Pahsimeroi River
1982	Pahsimeroi	75,402	Summer Chinook	1984	55,800	Pahsimeroi River
1982	Hayden Creek	107,234	Spring Chinook	1984	99,750	Pahsimeroi River
1982	Sawtooth	451,902	Spring Chinook	1984	420,400	Pahsimeroi River
1982	Rapid River	669,500	Spring Chinook	1984	622,850	Pahsimeroi River
1983	Pahsimeroi	261,188	Summer Chinook	1985	209,105	Pahsimeroi River
1983	Hayden Creek	279,398	Spring Chinook	1985	178,800	Pahsimeroi River
1984	Pahsimeroi	23,999	Summer Chinook	1986	12,100	Pahsimeroi River
1984	Hayden Creek	145,341	Spring Chinook	1986	81,000	Pahsimeroi River
1985	Pahsimeroi	2,602,404	Spring Chinook	1987	1,200,000	Hayden Creek and Yankee Fork
1985	Pahsimeroi	200,448	Summer Chinook	1987	158,007	Pahsimeroi River
1985	Pahsimeroi	127,332	Summer Chinook	1987	100,593	Pahsimeroi River
1987	Pahsimeroi	2,128,750	Spring Chinook	1989	1,128,750	Sawtooth Hatchery
1987	Pahsimeroi	696,004	Summer Chinook	1989	536,500	Pahsimeroi River
1987	McCall	605,091	Summer Chinook	1989	479,800	Pahsimeroi River
1988	Pahsimeroi	1,053,536	Summer Chinook	1990	808,536	Pahsimeroi River
1988	McCall	317,272	Summer Chinook	1990	245,000	Pahsimeroi River
1989	Pahsimeroi	294,893	Summer Chinook	1991	227,500	Pahsimeroi River
1990	Pahsimeroi	662,641	Summer Chinook	1992	605,900	Pahsimeroi River
1991	Pahsimeroi	22,235	Spring Chinook	1993	15,000	Rapid River
1991	Pahsimeroi	437,157	Summer Chinook	1993	375,000	Pahsimeroi River
1992	Pahsimeroi	172,139	Summer Chinook	1994	130,510	Pahsimeroi River
1993	Pahsimeroi	167,200	Summer Chinook	1995	147,429	Pahsimeroi River
1994	Pahsimeroi	0	Summer Chinook	1996	0	Pahsimeroi River
1995	Pahsimeroi	157,938	Summer Chinook	1997	122,017	Pahsimeroi River
1996	Pahsimeroi	85,660	Summer Chinook	1998	65,648	Pahsimeroi River
1997	Pahsimeroi	171,836	Summer Chinook	1999	135,669	Pahsimeroi River
1998	Pahsimeroi	74,105	Summer Chinook	2000	53,837	Pahsimeroi River

Appendix C. Pahsimeroi Hatchery summer chinook listing status by Brood Year and Return Year.

Brood Year	Age At Return			Return Year	Comments
	3	4	5		
				1991	By 91- Pre-listing, no listed brood stock.
				1992	BY92- fish listed while in the hatchery, progeny of natural origin fish are listed. Could not
					differentiate H and N fish, so all treated as Listed
BY91				1993	By93- all fish were RV and all treated as listed
BY92	NL			1994	BY94- no broodstock taken in 1994
BY93	ad-L, LV-L	NL		1995	BY95- All fish spawned were ad-NL, 35 females, progeny not listed.
BY94	RV-L	ad-L, LV-L	NL	1996	BY96- 9 listed and 9 unlisted crosses, but all were ad-clipped, treated as Listed.
BY95	no H returns	RV-L	ad-L, LV-L	1997	BY97- 32 females spawned, most unmarked x rv, progeny listed-ad, 135,700 smolts
BY96	ad-NL	no H returns	RV-L	1998	BY98- 13 females spawned, most unmarked & rv, progeny listed-ad, 53,800 smolts
BY97	ad-L	ad-NL	no H returns	1999	BY99- 79 females spawned, ad-NL 202K, 100%cwt ISS 85,600 (5/22/00)
BY98	ad-L	ad-L	ad-NL	2000	
BY99	ad-L	ad-L	ad-L	2001	
	ad-NL; CWT-L	ad-L	ad-L	2002	
		ad-NL;CWT-L	ad-L	2003	
			ad-NL; CWT-L	2004	

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